Old Series Vol. VII | CONTINUATION OF THE BULLETIN OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION | New Series Vol. II

BIRD-BANDING

A Journal of Ornithological Investigation

Vol. II January, 1931 No. 1

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

CONTENTS

A Study of the Chickadee and White-breasted Nuthatch by Means of Marked Individuals. Part II: The Chickadee (*Penthestes atricapillus atricapillus*). By *Wilbur K. Butts, Ph.D.* 1 Figure and 2 Maps 1

Bird-Banding; Its First Decade Under the Biological Survey. By *Frederick C. Lincoln* 27

General Notes: A Banded Adult Common Cormorant, 33; Protocalliphora Infestation of Barn and Bank Swallows, 33; First Banding of the Little Blue Heron in New England, 34; Parasites on Birds Taken at Summerville, South Carolina, 34; A Banded Little Blue Heron in New Jersey, 35; Foot Disease on Birds at Summerville, South Carolina, 35; Irregular Molting of a Savannah Sparrow, 35; A Song Sparrow Return-4, 36; Banding Starlings, 36; Wing Injury, 36; Repeating White-throats, 37; Variations in Towhee Irises and Rectrices, 37; What Was Wrong with this House Wren?, 38; Plumage Pattern of the Screech Owl, 38; Three White-crowned Sparrow Recoveries, 39; Note on Tree Sparrow Groups, 39; Our Cover Design, 39.

Recent Literature.—American Waterfowl; Their Present Situation and the Outlook for Their Future, 40; Der Vogelzug, Vol. I, No. 4, October, 1930, 41; Wilson Bulletin, Vol. XLII, No. 2, 43; Wilson Bulletin, Vol. XLII, No. 3, 43; British Birds, Vol. XXIV, No. 2, 43; British Birds, Vol. XXIV, No. 3, 43.

Correspondence.—Making Celluloid Bands, 44.

BIRD - BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. II JANUARY, 1931 NO. 1

A STUDY OF THE CHICKADEE AND WHITE-BREASTED NUTHATCH BY MEANS OF MARKED INDIVIDUALS

Part II: The Chickadee (*Penthestes atricapillus atricapillus*).

By WILBUR K. BUTTS, Ph.D.

Migration. Throughout almost its entire range in eastern North America, north of 40° latitude, the Black-capped Chickadee is recorded as a common permanent resident. There is, however, considerable evidence of migratory or wandering movements. It occurs slightly farther south in winter than in the breeding-season, it being a winter visitant only in southern New Jersey, Maryland, and the southern parts of Ohio, Indiana, Illinois, and Missouri.[1] In localities where it occurs throughout the year many observers report the Chickadee to be more abundant in fall and winter than during the breeding-season.[2] The most interesting record of a migration of the Chickadee is given by VanTyne, who reports that on May 20, 1928, in the daytime, he witnessed a flock of fifty Chickadees start out from Sand Point to cross Saginaw Bay, Lake Huron. The remarkable feature of this record is the lateness of the date, May 20th, since Chickadees appear to leave their winter quarters early in April.

In considering these evidences of a migratory movement, it should be remembered that even if birds appear to be more numerous during the winter, it is not proved that there really are more individuals present. Many birds are so much more conspicuous in winter than in summer that they may seem to be more abundant. The distributional records show that there

[1]Shriner, "Birds of New Jersey"; Kirkwood, "Birds of Maryland"; Dawson and Jones, "Birds of Ohio"; Widman, "Preliminary Catalogue of the Birds of Missouri."

[2]Griscom, "Birds of New York City Region"; Douthitt, "Migration Records of Kansas Birds"; Taverner and Swales, "Birds of Point Pelee"; and many others.

is a movement of Chickadees, but it is not proved that there is a distinct north and south migration.

Bird-banding operations at some stations seem to indicate that there is an arrival of Chickadees in the fall and a departure in the spring, but the records have as yet given no proof of a distinct north-and-south migratory movement. Published records show only two Chickadee recoveries at points other than the place of banding. These two were recovered at distances of only three and twenty miles. The records do show, however, that there are many permanent resident individuals. The records at most stations do not show whether there are more individuals present in winter than in summer, since at most stations few Chickadees are trapped in the breeding-season. Individuals which are recorded only during the winter months may really be present throughout the year.

In the present investigation an effort was made to determine the number of Chickadees present in the winter and in the breeding season in the Louis Agassiz Fuertes Bird Sanctuary at Ithaca, New York. The Sanctuary is a typical bottomland woods with an area of about eighty acres. Four feeding and trapping stations, which I have called the North, East, South, and West Side Stations, were operated in the Sanctuary. In addition to these, sixteen others, referred to as the Lighthouse Road, Hillside, Glenside, and Golf Club stations, covering an area of a little more than a square mile of semi-wooded, suburban and residential territory, were operated. Efforts, however, were concentrated principally on a study of the birds in the Sanctuary. The location of these stations is shown on Map 1, and the number of Chickadees recorded at each are shown in the accompanying table, see page 3.

By applying colored bands to the birds trapped, and then watching for the marked birds, I was able to determine with a fair degree of accuracy the number of Chickadees present at any time in the Fuertes Sanctuary during the winter and spring. Between 60 and 65 Chickadees were seen there between December 10, 1928, and July 1, 1929. Of these 50 were banded. The date of banding and the approximate length of stay of these 50 birds is shown in the diagram.

Because of the difficulty of trapping the birds during the fall, the exact time of their appearance is not known. However, Chickadees were common in the Sanctuary during September, and since several birds banded at other stations in October were still present in January, it is thought that many of them arrived in September and October.

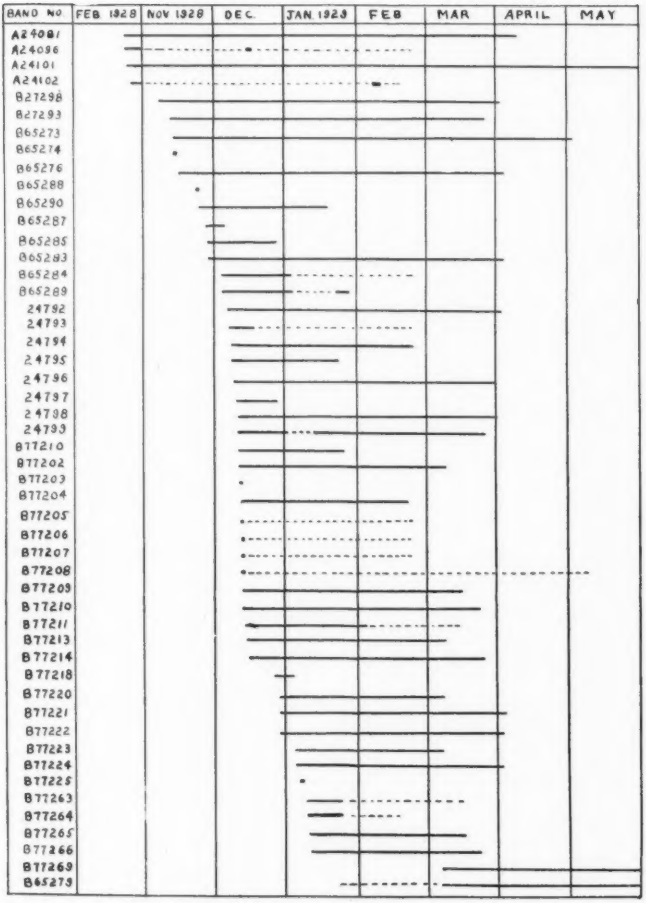


DIAGRAM SHOWING DATE OF BANDING AND LENGTH OF STAY OF CHICKADEES IN FUERTES SANCTUARY

Broken lines indicate that the birds left the Sanctuary but were recorded at other nearby stations.

By December 10th it appeared that practically all the Chickadees in the Sanctuary had been banded, and trapping was suspended for a time. The last week in December, however, a number of unbanded birds were seen. Trapping was recommenced, and eleven new birds were banded between December 29th and January 18th. The records for the Golf Club banding stations are similar. The weather had been very mild up to December 22d, when there were a few cold days. Cold weather started in earnest early in January. The records thus seem to indicate that the advent of cold weather brought in a number of new birds.

From January 18th till early in March no birds without bands were seen in the Sanctuary, except some members of a flock which occasionally entered the area from the west.

The vast majority of the birds stayed all through the winter, although some of them left the Sanctuary and were recorded from other near-by stations. These individuals are indicated by dotted lines in the diagram. The length of stay of individuals living in the vicinity of my other stations is not definitely known, since stations outside of the Sanctuary were not visited frequently enough to keep an accurate record in this respect. Of the birds in the Sanctuary, 2 disappeared in November, 4 in December, 5 in January, 2 in February, 11 in March, and 8 in April. It should be remembered that some of the birds recorded as having disappeared at a given time may have been present for a somewhat longer period, since it was by no means possible to find every bird that was present each day that observations were made. The disappearance of some of these birds was probably due to their death. If we assume the average length of life of the Chickadee to be three years (studies of the Purple Finch by Magee (1928) show that it is probably less than this for that species), and assume that the mortality rate is the same at all seasons of the year, there is a probability that three or four of the 50 birds would die during the winter. The records indicate, then, that there is little, if any, migration during the winter.

The records seem to indicate, also, that there are very few birds passing through Ithaca in the fall. Only four birds were recorded but once. It should be remembered, however, that transient visitants are much less likely to get caught than are the resident individuals. Accordingly, there may have been more individuals passing through than the records seem to indicate. All through the fall many unbanded birds, which may have been transients, were seen.

The evidence shows that there were but few, if any, arrivals from the South in the spring. Only one bird was banded in the Sanctuary in March, and only two or three other unbanded birds were seen. These, as we shall point out later in the discussion of local movements, were very likely birds which had spent the winter at no great distance from the Sanctuary. At Cascadilla about a mile distant (see map 1) a few new birds appeared in March. In the vicinity of the other stations very few unbanded birds were seen in the spring. As not quite all the winter individuals had been marked, possibly these unbanded birds had also spent the winter here.

It may be seen by referring to the diagram that most of the birds in the Sanctuary left in March or early April. They began to disappear after the first warm springlike days early in March at the time that the first Grackles and Red-winged Blackbirds appeared, and when Robins and Song Sparrows became plentiful. By the middle of April only the permanent resident individuals were left. Spring was rather early in 1929, however. In 1928 the birds remained for a somewhat longer period.

While the number of Chickadees seen in the Sanctuary durnig the winter and spring was between 60 and 65, only about half this number were present at any given time in the winter. The rest were birds which were recorded but once, or which spent only a part of their time in the Sanctuary. Placing the number of winter resident individuals at 30 and the area of the Sanctuary at 80 acres, this gives a density of population for the Chickadee during the winter of one bird for each two and two-thirds acres.

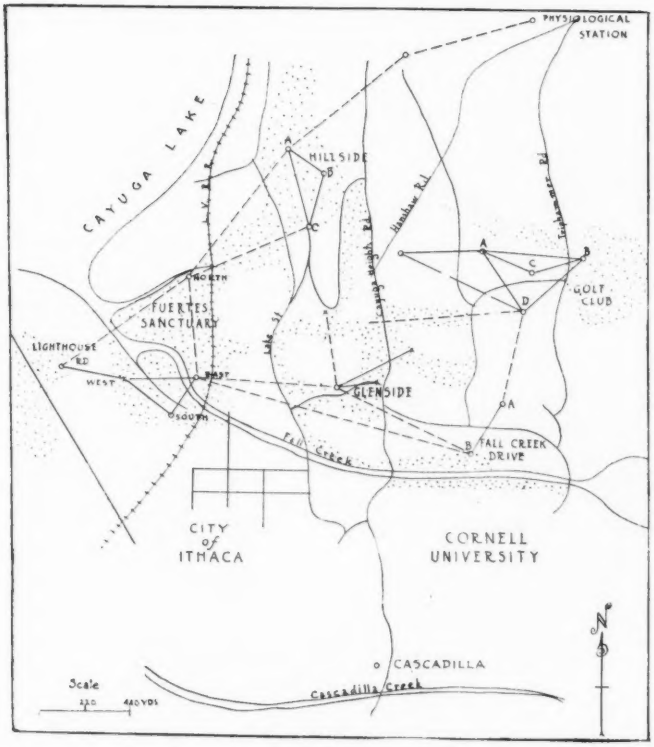
If we consider the whole area where the birds were studied as shown on map 1, we find that approximately 145 birds (148 banded, minus 21 banded but which apparently did not remain in the area, plus 18, estimated, unbanded) spent the winter in an area of a little more than a square mile. This gives one bird to about five acres, or 125 per square mile. In comparing these figures with the density of the Chickadee population in the Sanctuary, it should be remembered that the latter area is completely wooded, while the area as a whole has only scattered woods, shade trees, and shrubbery. It is noteworthy that these figures are considerably higher than estimates made on the abundance of the Chickadee in New Hampshire by Weed (1898) and in Michigan by Sanderson (1898). The former estimated that there were thirty-five per square mile, the latter only seven. The estimates were based on the number they observed while collecting them for food

studies. The number found at Ithaca is probably not an exceptional one. Other bird-banders have captured as many or more birds at one station than were reported from any one station in this investigation. Mrs. J. S. Chamberlain caught 48 Chickadees in one winter at Amherst, Mass. Whether the number of birds was increased by the presence of the feeding stations will be discussed later.

I was able to find only two pairs of Chickadees nesting in the Sanctuary in 1928. The number was the same in 1929. There may have been one or two other pairs present, since Chickadees are rather quiet during the nesting-season, and it is difficult to detect their presence in the dense tangle of vegetation growing in the Sanctuary. It is possible also that a few others nested in the neighborhood. A considerable amount of searching, however, indicated that there could scarcely be more than eight or ten of the thirty winter resident birds left in the vicinity in the breeding-season and probably only six or eight.

In the whole area where the birds were studied, 30 Chickadees were found during the breeding-season. No doubt all those present were not found, but from the figures it seems reasonable to estimate that there are four or five times as many Chickadees present in winter as in summer. The question then arises, whence do the winter resident individuals come? There are three possible theories regarding their origin. First, they may be young birds which have wandered from the locality of their birthplace, such as the bird which appeared in the vicinity of the Golf Club in the fall and which was one of the young from a nest at Glenside (see map 1). Undoubtedly a part of the increase in the number of birds in the fall may be accounted for in this way. However, reproduction alone could scarcely account for the increased number of new birds appearing. Furthermore, the winter resident birds do not appear until September and October, many of them not until December. If they were young birds, they would be present in July and August. This theory, also, would not account for the thinning-out of the birds in the spring.

Another theory is that they are birds which have nested on near-by hills and have come into the valleys to winter. The fact that when the flocks break up in the spring the individuals start out in all directions (see map 1), lends support to this view. According to this theory, however, we must suppose that in the higher parts of their range the birds are practically absent, or at least scarce, in winter. While this is barely possible in the Northeastern States, it could scarcely be true



MAP 1 SHOWING MOVEMENTS OF CHICADEES FROM STATION TO STATION IN WINTER.

Solid lines between stations indicate that the birds travelled freely between the two points.

Broken lines indicate a few records from one point to the other.

Dotted areas indicate woods.

in the Middle West, where the Chickadee appears to be everywhere abundant in winter.

The third theory is that the birds are migrants and have come from the north. To test the validity of this theory let us examine the status of the Chickadee in Canada. In southern Canada its seasonal distribution is the same as in the United States. At Montreal, for example, it is recorded as a common winter visitant (September 17th, April 25th) and a rather scarce summer resident (Wintle, 1896; Terrill, 1911). About the city of Quebec it is said by Dionne (1906) to be most abundant in fall and spring, less common in winter, and nearly absent in summer. Somewhat farther north, in Gaspé County, at the mouth of the St. Lawrence River the Chickadee is also present throughout the year, but is said to be more common after March 15th than in the winter (DeMille, 1926). It is a common permanent resident in all the Maritime Provinces and in Newfoundland (Macoun, 1909). The Chickadee occurs in timbered regions in Labrador in summer, but whether it is present in winter is uncertain. But little has been published regarding the winter birds of northern regions. Townsend and Allen (1907) report that the Chickadee is a not uncommon summer resident in southern Labrador. Alexander Wilson (1808) says the Black-capped Chickadee is *most plentiful* during the *winter* in the region about Hudson Bay. Owing to the possibility of confusion with the Hudsonian Chickadee, little reliance should be placed on this record. Chickadees are reported as being present throughout the year at Lake Mistassini, half way between Hudson Bay and the Gulf of St. Lawrence, by Low (1891). Unfortunately the author does not state whether the birds observed were Hudsonian or Black-capped Chickadees.

Thompson (1922) reports that the Chickadee appears to be largely a transient visitant at North Bay, Ontario; common in late spring; not observed in summer, appearing in fall at the end of September; and occasionally seen in winter. North Bay is less than a hundred miles from Georgian Bay, Lake Huron, but it has a very cold climate. Chickadees were seen in the middle of March during winter conditions in intense cold at Inglehart, 138 miles north of North Bay (Eifrig, 1909). Unpublished records of Dr. H. F. Lewis state that two Chickadees were seen by him at North Bay, Ontario, on February 10, 1922. At Cochrane, Ontario, half way between the Great Lakes and James Bay, none was seen on a ten-mile walk through forested country on March 9, 1924.

In order to get more definite knowledge regarding the

Chickadee in winter in the northern part of its range, the names of some correspondents living in the region midway between the Great Lakes and James Bay were obtained from Dr. Lewis. One of these, Mr. C. Sequin, taxidermist and trapper at Mattagami Heights, Ontario, wrote that the Chickadees appear to be most numerous in November and are as common in winter as in summer in that locality. Mr. W. K. Scobbie, teacher of Zoölogy at Iroquois Falls, Ontario, also reported that the Chickadee is as common in winter as in summer. It is more frequently seen in winter, since in the breeding season it remains in the depths of the woods. Mr. Harry E. Ricker, science teacher at the Normal School, North Bay, Ontario, likewise wrote that the Chickadee is present throughout the year, although less frequently seen in winter, since the depth of the snow prevents the ordinary observer from roaming around as much at this season. These correspondents are evidently able to distinguish between the Hudsonian and Black-capped Chickadees, and we may conclude from these records that the Chickadee is present in winter at points as far north as we have any definite information, though, it is apparently not as numerous in winter as it is in southern Canada and the United States. Since some of the records in the North indicate a greater abundance of birds in fall and spring, it is possible that there is a migration of birds from the extreme northern part of their range, where we as yet have no records, and this may account for the increase in numbers of the Chickadee in the United States.

Local Movements. As is well known, Chickadees travel about during the fall and winter in small groups or flocks. The number of birds seen together may be anywhere from two to fifty or sixty. Single birds are also frequently seen. Usually however, a flock consists of about a dozen birds. It is difficult to determine the number in a flock, but when the birds are banded with colored bands, each individual can be identified and the total number in the group determined. These flocks behave as semi-permanent units. When smaller groups are seen in the winter, they are in most cases not complete flocks. Often a flock will temporarily partly break up. Thus small groups or single birds may become separated from the rest. When larger groups are seen, these are probably formed by the coming together of two regular flocks. Possibly, also, the birds sometimes migrate in larger units.

The association of Chickadees, Nuthatches, and Woodpeckers is only a temporary one. Often a pair of Nuthatches or a few Woodpeckers accompanied the flocks of Chickadees,

but more often the Chickadees were alone. When a flock composed of two or more species was followed, it was sometimes observed to break up, the Chickadees going one way, the other birds another. It is not always the same pair of Nuthatches which accompany a given flock of Chickadees. As we shall see later, each flock of Chickadees has a definite range, and each pair of Nuthatches a definite range. But the two ranges do not necessarily coincide. Therefore, when the Chickadees are in one part of their range, one pair of Nuthatches may be with them; when in another part of their range, another pair may be present. It is true, however, that one usually sees the same pair of Nuthatches with a given flock of Chickadees.

The number of Chickadees which fed regularly during January at the North Side station, Fuertes Sanctuary, was fourteen. The number at the East and South Side stations was sixteen. The same birds visited both the East and South Side stations, which are 220 yards apart. On any one day, however, it was unusual to record all the birds which commonly visited the station, partly because some birds which did come were missed on account of difficulties in observation, and partly because some individuals really belonging to the flock had temporarily become separated from it and did not visit the feeding station while the observations were being made. The actual number observed in a flock in January at the Sanctuary feeding stations varied from nine to fifteen. The number of birds feeding at the other stations was not accurately determined, but it appeared to be about the same.

While the average number of birds feeding regularly at each station in the Sanctuary during the winter was fifteen, other birds occasionally came to the food and as many as twenty were seen at a station at one time. Thus, on December 8th five birds (Nos. A24096, B77205-06-07-08) were taken at the North Side station. Subsequent study of these birds showed that they regularly inhabited the region about the Hillside stations. Similarly, on January 21st a flock of about eight Chickadees which usually stayed in the vicinity of the Lighthouse Road station to the west, came to the North Side station. Here they fed for a few minutes. The regular North Side flock was also present at this time, and the two groups became mixed. Presently the Lighthouse Road Chickadees left. It is noteworthy that none of the North Side birds followed the Lighthouse Road birds, nor did any of the Lighthouse Road ones remain. The two flocks were segregated completely. The Lighthouse Road birds did not seem to be driven

away, as there was no more fighting than is usual at a feeding station. However, they did not stay long. Probably some of the birds did not obtain any of the food at all. We will give presently further data showing mixing and segregation of flocks.

While the different flocks thus seemed to behave as permanent units, if one followed a flock and kept a record of the birds seen as he went along, it would appear as if the personnel of the flock were changing. At one time certain birds would be in evidence. A short time later some of these would have disappeared and other individuals would have taken their places. This change was caused by some individuals getting left behind, straying from the main part of the flock, or staying in the tree-tops where they were not observed. As the flock progressed through the woods, new birds, which had previously become separated, would be picked up. A slight change in personnel was also brought about in another way. A few individuals (Nos. 65284, 65289, 24793, 24799, 77211) left the South Side flock and later appeared at Glenside. Two of these (Nos. 65284 and 24799) later returned to the Sanctuary. The others become permanent members of the Glenside flock and were seen in the neighborhood of Glenside regularly. While the shifting of the range of some birds during the winter caused some variation in the individuals visiting a certain station, nevertheless in the main the same flock visited the station at the end of the winter as at the beginning. We can conclude from theses data that the flocks are semi-permanent units.

As mentioned in the discussion of migration, the flocks began to break up during the warm weather of the latter part of March. Small groups, however, were seen early in April. After the middle of April the birds were seen only in pairs. In the previous season's study (1927-28) two small flocks were seen about July first. Two of the birds in one of them were individuals which a short time before had had their nest broken up. The origin of the other birds is not known. They were evidently not immature birds. A number of unbanded adults were also seen in the summer at Glenside, which seems to indicate a wandering movement during the summer.

It has long been supposed that small flocks seen in fall and winter are family groups consisting of a mated pair with the young of the preceding nesting-season. This was shown not to be the case. Two families were banded in June, 1928, at Glenside. In a flock of about a dozen Chickadees living near this station the following winter, three of the parents were

found. One of the young birds appeared at the Golf Club stations (three-quarters of a mile east) in October and spent the winter there. Another one was seen in April a mile and a quarter southeast of the nesting-site.

As we have already intimated, each flock did not wander about from place to place but had a rather definite, restricted, feeding-area. The Chickadees in the Sanctuary were divided into two groups which I have called the North Side and the South Side flocks; the North Side birds feeding in the vicinity of the North Side station, and the South Side birds feeding at the East, West, and South Side stations. The first week in December there were a few records of birds going from the North to the East Side station (550 yards apart) or *vice versa*, but between December 10th and January 25th no North Side birds, so far as known, visited the East Side station, nor did any South Side birds visit the North Side station. On a number of occasions the North Side birds were followed for several hours in order to determine how much territory they covered. Several times they went to within fifty yards of the East Side station but they always turned westward before reaching it. The territory of the North Side flock was about forty acres, that of the South Side flock was probably a little more than this.

The small size of the area covered by the flocks was surprising. One wondered whether their movements were influenced by the presence of the feeding stations. Under natural conditions would the birds wander more widely? Would they find sufficient food in such a small area? Bird-banding operations have shown that many species of birds stay in the vicinity of one feeding station during the winter and do not appear at other near-by stations, but they do not show whether this is a natural condition or one brought about by the presence of the food. With the usual banding procedure it is necessary to put out food in order to trap and identify the birds, but since in the present study the birds could be identified without trapping, the food could be removed. Accordingly on January 24th, the North Side feeding station was discontinued. The next day no observations were made, but on the second day eight of the North Side birds were seen at the East Side station in company with the South Side birds which regularly fed there. It was thus seen that when the feeding station was removed the birds immediately increased their feeding-range. On February 3rd all feeding stations in the Sanctuary except the South Side station were discontinued. On February 4th several North Side birds were seen at the

South Side station in company with the South Side flock. Eventually eleven out of the fourteen North Side birds appeared at the South Side. Two of the three missing birds were never seen again. The other was observed at the North Side station again on March 25th after feeding had been resumed at this point.

Would the birds now leave the Sanctuary and appear at other stations if only natural food were available for them? To determine this point, the one remaining feeding station in the Sanctuary was discontinued on February 10th. The birds were then watched for at Lighthouse Road, Hillside, and Glenside stations. However, they did not leave the Sanctuary. All the birds which were regular visitors at the feeding stations up to the time that the food was taken down, were seen in the Sanctuary for at least a week afterward. All but two were known to be present until warm weather began in March.

During the time that no food was put out for the birds they ranged over a large part of the Sanctuary. Over how much of it could not be determined accurately since the birds were now more difficult to find. However, they were located and followed on a number of occasions. Once they left the Sanctuary, going a distance of one fourth of a mile east, and then returning.

While feeding was discontinued the North and South Side birds were often together in one flock. Twenty-two birds (ten North Side and twelve South Side) was the largest number seen together at one time. To a certain extent, however, the two flocks still behaved as separate units. Often they were segregated, either completely or almost so. For example, on February 16th a flock of nine birds on the South Side was composed of eight South Side birds and one North Side bird. On the same day a flock of nine birds observed near the center of the woods north of Fall Creek was composed entirely of North Side birds. At this time, the middle of February, there was a tendency for the North Side birds to occur more frequently in the northern part of the Sanctuary, while the South Side birds were never seen any distance north of the center of the woods. Accordingly it seems that the ranges of the two groups were not the same, although both groups were found ranging over a large part of the Sanctuary, which has an estimated area of eighty acres.

On February 26th food was again provided at the North and South Side stations. It was believed that the two flocks might be completely segregated again and behave as formerly, but soon after feeding was recommenced, the influence of

spring began to be felt, and the feeding stations were apparently not so much of an attraction to the birds. However, the birds did return to the South Side Station, twelve South Side and two North Side birds being recorded there in March. Only four of the North Side birds reappeared at the North Side station. We may conclude from this experiment that the presence of a feeding station does restrict the range of the Chickadee, but that even under natural conditions the flocks have rather definite feeding-territories and do not wander far.

The question might also be asked, do two flocks ever have the same territory? From the data obtained in the Sanctuary it would seem that two flocks may inhabit the same area. The two flocks at first had distinctly separate territories. The North Side flock invaded the territory of the South Side group and fed at the same stations as the latter birds only after it could no longer obtain food in the usual place. When inhabiting the same area, the two flocks tended to consolidate and form one. The data obtained at the other feeding stations show that in the main only one group of birds fed regularly at a station. Each flock had its feeding territory. These territories did not have definite boundaries, and often groups would be seen at points outside of their usual range. We have already mentioned, for example, the fact that Chickadees inhabiting the area about the Hillside stations occasionally visited the North Side station in the Sanctuary.

The greatest distance travelled by any flock from its regular feeding station was a half mile. One flock travelled nearly this distance in one direction, and nearly a quarter of a mile in the opposite direction, so that the flock was recorded at points a little less than three quarters of a mile apart. The extent which birds went from one station to another is shown on map 1.

Although no flock of Chickadees was recorded as having travelled as much as three fourths of a mile, individual birds did in some cases get farther away from the station where they were banded. This was because at first they were members of one flock, and later on they joined another flock with a different territory. In this way one or two birds banded in the Sanctuary in December, joined the flock with a territory about Glenside, and finally went with these birds as far as Fall Creek Drive, a distance fully three fourths of a mile from the place where they were banded.

Other bird-banders have also noted that Chickadees do not usually travel long distances when feeding in winter. It is reported by Horsey (1924) that Chickadees banded at Roches-

ter, N. Y., did not travel between two stations only 835 feet apart. According to the data of the present investigation, this is exceptional. It may have been due to the kind of environment between the two stations. Mrs. J. S. Chamberlain writes that in Amherst, Massachusetts, three banding stations are operated. These form a triangle, roughly half a mile on a side. At one station 48 Chickadees were taken in the winter of 1928-29. Only two of these came from the other stations. At each point only one or two birds were recorded as having come from another station.

It is believed by some that Chickadees in searching for food during the winter have definite routes over which they travel on schedule time. W. L. McAtee (1920) says: "Our feeding stations with practically inexhaustible supplies are periodically visited, and tempting as they are, usually do not localize the bird. Many observations by the writer, confirmed by comparing notes with others, indicate that various birds have more or less regular beats which they cover approximately on schedule." While Chickadees do have regular beats in the sense that they usually confine themselves to a certain area, no definite routes or regular paths over which they travelled were found during these investigations except those determined by the presence or absence of trees or shrubbery. Sometimes birds approached a station from one direction, sometimes from another. After leaving a station they sometimes went in one direction, sometimes in another. On some days they appeared at a certain station in the afternoon; on other days, this was not the case. Sometimes they remained for five minutes at a station; at other times they were about for an hour or more.

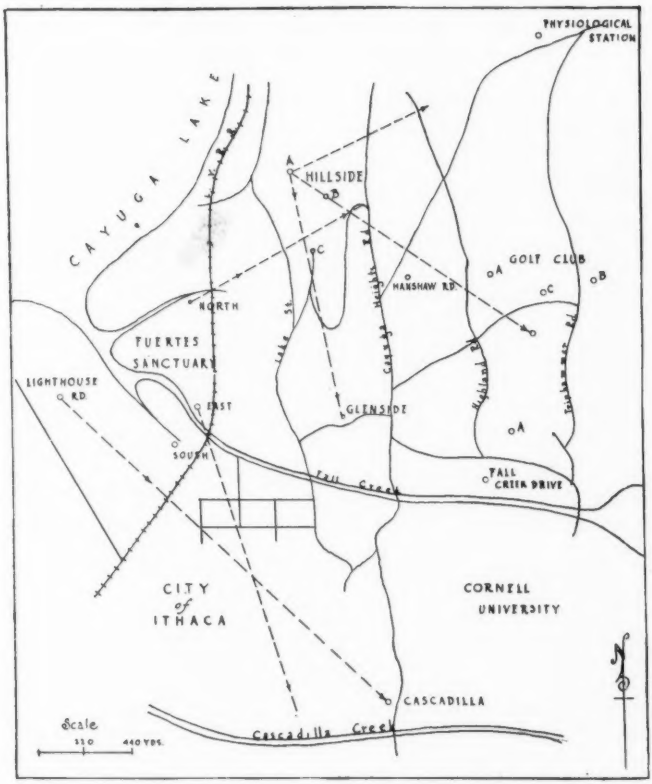
Some operators of feeding stations report that Chickadees come more frequently at certain times than at others. Thus it was reported at one station that the birds fed at breakfast time, at the lunch hour, and again later in the afternoon. My own observations at this and other stations showed that the birds were likely to be there at any time. When only one feeding station was within the range of the birds, they were seldom absent from it much more than three quarters of an hour. There was a tendency, however, for the birds to visit the feeding stations more frequently in the morning and on cold days. The general procedure of the birds was to stay at a station on the average for half an hour, although sometimes for a much longer period, and then be gone for half an hour or an hour. During their periods of absence they went a distance of two or three hundred yards and then returned,

usually by a somewhat different route. Sometimes they merely roved about in the vicinity of the station. On leaving a station they travelled leisurely, going at the rate of not more than two miles an hour, feeding as they went, and occasionally stopping for as much as half an hour in one place, but the return to the feeding station was made much more rapidly. One could not keep up with them. It seemed as if they suddenly became hungry, remembered the feeding station, and returned to it by the shortest route. On their travels they kept largely to the woods, orchards, shade trees, hedgerows, and shrubbery. Open spaces they crossed at the narrowest point. The greatest distance they were observed to traverse in the open was one hundred seventy-five yards.

The data we have given thus far apply to the movements of the Chickadees during the winter only. The case is somewhat different when the flocks begin to break up on the approach of spring. After March 7th there were a number of records of birds being seen at considerable distances from the point of banding. These are shown on map 2. Apparently these birds were looking for mates or for suitable places for breeding. One pair started to clean out a hole in a cherry tree in the city. In spite of this wandering movement, however, all the Chickadees actually found nesting were within or near the area where they spent the winter.

An experiment was performed to see what would happen if a group of Chickadees were removed from their winter territory and liberated at another place. This is an important practical question, since it is desirable to know whether a species can be increased in numbers in one locality by bringing birds in from outside. Accordingly, on February 17th, eleven Chickadees were captured at the Poultry Farm and taken to the Lighthouse Road station, some two miles west. One bird died and three escaped without being banded. The remaining seven were provided with yellow and red bands and were painted blue to make identification easy. The next day all had disappeared from the vicinity where liberated. One went back to the Poultry Farm, and later nested there. Possibly others returned also, but several hours' search failed to reveal them. Perhaps a similar experiment in the fall before the newly arrived birds had formed an attachment for a feeding area, would have a different result.

Relation to Feeding Stations—There are a number of interesting questions regarding the operation of feeding stations which were brought out by the present study. How close together must feeding stations be placed in order to reach every



MAP 2 SHOWING MOVEMENTS OF CHICKADEES IN SPRING

Chickadee in a given area? Chickadees went freely between the East and South Side Stations of the Sanctuary, 220 yards apart. Therefore it is not necessary to have them as close together as this. The birds did not go freely between the North and East Side stations (550 yards apart) while both were in operation, but the North Side birds did find the food at the East Side station when the North Side station was discontinued. Evidently one feeding station in the center of the Sanctuary would have been found by all the birds residing within the area. The birds travelled frequently between the East and West Side stations also. Hence, if one of these stations had been the only one operated it would have been found by all the birds. One station near the northern edge of the woods was not sufficient to reach all the birds in the Sanctuary. This is well shown by the trapping in 1927-28. In that season the North Side station was the only one operated until the latter part of February, when the East Side station was started. In February it was apparent that all the birds at the North Side station were banded. The number banded, 21, was practically the same as the number banded here the following season. When the East Side station was started, 14 new birds were banded in about a week. Evidently the North Side station had not been found by all the Chickadees living in the Sanctuary. These data show that the natural feeding-range of the Chickadee in that particular environment was less than the length of the Sanctuary (850 yards) from north to south but equal to, or greater than, the width (500 yards) from east to west.

If feeding stations are separated by a distance not greater than the natural feeding-range of the bird, they will be found by all the birds within the area, so we can say that stations some seven hundred yards apart are ample. One station will feed the Chickadees in seventy-five acres. Although the natural feeding-range of the Chickadee is three-eighths of a mile, occasionally flocks did travel over a half-mile. These longer distances, however, were not travelled regularly, and to reach all the birds the stations should not be farther apart than the distance traveled regularly. There is no doubt some variation in the area covered in different types of environment. The data collected at the other stations verify the figures given. In general when stations were less than three-eighths of a mile apart, birds went freely from one to another. When between three-eighths of a mile and half a mile apart, some birds were recorded at both stations, although in the main the birds feeding at one were different individuals

from those feeding at the other. When more than a half-mile apart, different flocks visited them.

How many times a day does a flock visit a feeding station? The frequency with which the flocks visited the feeding stations was quite variable. It depended upon the weather, the number of feeding stations within the range of the flock, and the kind of food provided. As a general rule the flocks were absent from the station somewhat less than an hour. The length of time they remained in the vicinity of the station depended on the kind of food available. If suet was provided, they usually had enough in fifteen or twenty minutes. Under these conditions they made seven or eight visits a day. If sunflower seed or peanuts were available, they often stayed over an hour. Indeed, occasionally the flock never went far from the feeding station, and some of the birds were feeding all day long, or as long as the food lasted. Often when the main part of the flock left, a few individuals remained, so that there were birds at the station nearly all day.

How much food does a Chickadee eat at a feeding station in one day? At a single visit of a flock some Chickadees would take only a few sunflower seeds. At this rate no large amount would be eaten in a day. It was not unusual, however, for a bird to carry away a dozen or more seeds before leaving. Usually more food seemed to be taken in cold weather, but an extreme case was recorded on a bright warm day in March. At 10 A.M. no birds were present at the station. A quantity of sunflower seed was put out, and in a few minutes two Chickadees appeared. One wore a yellow band, and the other red and blue ones. Between 10:10 and 11:25 the yellow-banded bird took 70 seeds. This was at the rate of about one per minute. It was noted that the bird removed the shell of each seed and hid the kernel in a crack in the bark of some tree or shrub near by. A few of the seeds were eaten instead of being hidden, and once the bird ate some suet also. During this time the red-and-blue-banded bird was also storing seeds but at a much slower rate, only about half as many being taken. After an absence of a half-hour I returned at 12 o'clock and found the birds still taking seed after seed. At 2 o'clock the birds were still hard at work, although they had slowed down somewhat, 12 seeds being taken in twenty minutes. They had been joined in the meantime by two others. During the remainder of the time all four birds were collecting, though none of them as regularly as the yellow-banded bird. At 4 o'clock I made another visit to the station and found them still busily engaged, collecting at about the same rate.

Between 10:10 A.M. and 5 P.M. one bird must have taken between two hundred and fifty and three hundred seeds. Later study showed that the yellow-banded bird was a male and the red-and-blue-banded one a female. The pair nested near by, but the fact that they were storing food within what was later their nesting-territory is probably without significance, since it was found that at other stations many birds which did not nest in the vicinity also stored food.

Does the operation of a feeding station increase the number of Chickadees in the vicinity by attracting birds from outside areas? The evidence seems to indicate that such is not the case, that only the birds within whose natural range the feeding station is located find the food. Some of the feeding stations, such as the Sanctuary Stations and the Golf Club Stations, were started early in the season while others such as Physiology, Poultry Farm, Hillside, and Lighthouse Road stations were not begun until late in January. If the first two stations had attracted birds away from the surrounding regions, we should then expect a scarcity of birds at the stations started later. This was not the case, however (see tabulation).

Does the operation of a feeding station in the fall increaes the number of Chickadees present in winter by inducing wandering or migrating birds to remain in the neighborhood? The fact that there were practically as many birds living in the vicinity of the Hillside and Lighthouse Road stations, where food was not provided until January, as there were at the Sanctuary Stations, which were started September 28th, is an indication that the number of individuals present in winter is not increased by fall feeding.

By operating for several seasons two or more stations placed far enough apart so that birds would not go from one to the other, it would be possible to determine this point accurately.

There are a number of other interesting questions regarding feeding stations which could be answered by marking the birds with colored bands. For example, does a Chickadee which learns to eat out of one's hand one year remember its experience and come readily to the hand again the second season? Do Chickadees remember from one season to the next the location of a feeding station? Does the operation of a feeding station for successive seasons increase the number of birds in the vicinity?

Sexual Differentiation. There is no noticeable difference in the plumage of the sexes of the Chickadee. In a few cases in the present study the sex was determined by the behavior

during the breeding-season. An individual which did the incubating was judged to be a female; one which fed its mate was judged to be a male. C. L. Whittle (1927) has shown, however, that one cannot always be certain of the sex when one bird is seen feeding another. On one day Chickadee number A6012 was seen feeding A26677. On the next A26677 was feeding A6012. Identification of the individuals was made possible by colored enamelled bands. With birds marked with colored bands, when the sex of an individual is once ascertained, it can be determined at any time by simply referring to the records.

Breeding Territories. The territories of Chickadees appear to be ill defined. Sometimes they nest quite close together. Forbush (1907) records two nests only two rods apart. In the present investigation two nests were found about one hundred yards apart. The feeding-range during the nesting-period is greater than this, but neither pair was ever observed to go near the other birds' nest, or even in that direction. Chickadees are apt to nest in the same territory or near it for successive years. There are certain areas where Chickadees nest nearly every year. At Glenside one nesting-box, or another near-by box, has been occupied by Chickadees for several years. For two years the same female nested in the same box. Likewise in the Sanctuary a certain female nested in the same part of the woods for two years.

Twelve Chickadee nests were found or approximately located in the two years of the present study. All except three of the breeding birds were banded. Since in the locality where the nests were found not quite all the birds present during the winter were banded, it is thought that all the breeding birds were permanent residents. All the others seen in the nesting season but whose nests were not found were banded birds. In every case the nest was located within or quite near the birds' winter feeding-territory. This is probably not a universal rule, however, since it is known that many of the birds wander in the spring. One individual was seen investigating a hole nearly a mile from the point where it was banded in the winter.

Birds were first observed going in pairs and appearing as if they had picked out a breeding-territory in March. The nest, however, was not always built at the place the birds first selected. For example, two birds were seen together near the North Side station five or six times between March 6th and March 12th. They were not seen at this point after March 15th, but on April 23rd they were found excavating a hole in a

stump near the center of the woods, about three hundred yards from the North Side station. This site also was given up, and they finally constructed a nest about fifty yards farther away.

Between the time the nest is started and the time incubation begins, the birds do not stay all the time near the nest, but appear to range almost or quite as widely as they do in winter. In one case it was noted that when the first nest was broken up, the second one was built by the same pair at a distance of one hundred seventy-five yards from the first site.

Feeding the Young. Both sexes share about equally in feeding the young. At one nest the male fed fourteen times in an hour and fifteen minutes, the female eighteen times. This is at the rate of once every two and one-third minutes for both birds. At this time the six or seven young were about two-thirds grown. They left the nest five days later. The young were not fed regularly, however. The general procedure was to feed a number of times at frequent intervals, six or eight feedings in as many minutes. Then one or both parents would be gone from the nest for some time, occasionally as long as fifteen or twenty minutes. During these periods of absence the parents were not engaged all the time in looking for food. They appeared to have no difficulty in finding food within a minute or two in nearby shrubbery and shade trees. Several times I observed their behavior when away from the nest. On one occasion the male, after searching about for insects for a few moments, settled down for a rest in a shrub some two hundred feet from the nest. He preened his feathers for a long time, hopped about a little, and then continued the preening process. It was fully ten minutes before the search for food was begun again. In a minute or two more, he had a beakful of insects, which were carried to the nest. On this occasion the bird went one hundred yards from the nest. This was about the limit of the parents' feeding-range. Most of the food was obtained within fifty yards. One male bird, however, was once seen two hundred twenty yards from the nest.

Dispersal of Young. Mr. A. G. Lawrence writes that one Chickadee banded as a nestling in June in Winnipeg, Manitoba, was taken the following October in another part of the city six miles from the place of banding. Another nestling banded at Dell Rapids, South Dakota, was recovered the following winter at Pipestone, Minnesota, about twenty miles northeast from the nest-site.

Of thirteen nestlings banded in 1928 in Glenside, one was recovered at the Golf Club stations in the fall; one was doubtfully recorded in the winter about one and a half miles east

of the point of banding; and one was seen one and a fourth miles southeast in April. These records indicate that the young scatter in all directions. C. L. Whittle (1927), however, cites the case of a young Chickadee, banded on July 19, 1925, and presumably raised near the banding station, which stayed in the vicinity. It probably nested near by in 1927.

Change of Mates. One gets many surprises when he watches birds provided with colored bands. On June 3d a pair of Chickadees were found nesting in a bird-house along Fall Creek. One bird wore an aluminum band, but no celluloid band. The other bird was unbanded. The seven young were about one-third grown. Three days later, when I made observations, there was only one bird feeding the young and it was a different individual from either of the previously observed parents as it wore a blue celluloid band. My observations on all three birds were checked by another person, and inquiry made it certain that the colored band had not been applied in the meantime. Doubtless one of the original parents had been killed, and the other parent had obtained a new mate (the blue-banded bird), and then had been killed in turn, leaving only the foster-parent to bring up the young. This he, or she, succeeded in doing. An interesting fact is that this single bird fed the seven adopted young just as frequently as the pair of birds whose feeding operations we have already described. Fifty-five feedings were recorded in two hours and ten minutes, or at the rate of one in two and one-third minutes, the same figure given for the other feeding-rate. This nest was on the edge of a narrow strip of woods. A large part of the food was obtained within a hundred feet of the nest. Sometimes the bird went as far as two hundred feet, but apparently never farther. The total area in the feeding territory was about two thousand square yards. This is much smaller than the feeding-area of the other pair, but this territory was all woods, while the other had only scattered shade trees and shrubbery to provide insect food.

Cases of the disappearance of breeding birds were quite common. Perhaps the most interesting is that of a female who raised two broods in two seasons and had four mates. This bird and her first mate were both banded March 6, 1928. They raised a brood of six. The following fall and winter both birds were still present in the same territory. The male was last seen on January 10th. On April 4 and 6, 1929, the female was seen in the company of another bird, number 65278, examining a nesting-box, the same one she had used the preceding year. Number 65278 had been banded November 13,

1928, and had been in the same flock with the female all winter. On April 13th she was building a nest in the same nesting-box with the assistance of another bird, number 65272, which had been banded November 9, 1928, and which was also a member of the same flock. On April 26th she was still with this bird and the nest was apparently finished. It is not certain whether any eggs were laid at this time. The bird (number 65278) with whom she had previously been seen, was observed in the vicinity on May 10th, apparently mated to another bird. On May 8th her second mate of 1929, number 65272, had disappeared and his place had been taken by another male, the fourth one in two years. This bird was unbanded and may or may not have been present in the locality in the winter.

Chickadees are not always successful in obtaining a new mate. One other bird whose mate disappeared raised a brood alone. When she was first discovered, the young had evidently just hatched, and the parent divided her time between brooding the young and searching for food. She was off the nest for 4 minutes, then on the nest 15 minutes, off 10 minutes, on 8 minutes, off 1, on 1, off 1, on 4, off 1, on 1, off 1, on 10, off 1. Two days later feeding was more frequent, although considerable time was still spent on the nest.

I have no records of Chickadees having the same mates for two seasons. This is owing to the disappearance of one of the pair. Of three pairs nesting in 1928, the male of each pair had disappeared by the breeding season of 1929. Since birds which become mates are usually birds that have been together in the same flock during the winter, there is no doubt that a bird may get the second mate the second season in some instances. In fact C. L. Whittle (1927) reports a case where two Chickadees were apparently mated for two years.

Length of Life. In two years' study not much data can be accumulated regarding the length of life of a species. However, the frequent disappearance of nesting birds indicates a high mortality rate. Of six breeding Chickadees in 1928 only three were left in 1929. Of twelve breeding birds in 1929 five disappeared before nesting was over. It is probable the average length of life is not much, if any, over two years. There are banding records, however, of one Chickadee having survived seven years (banded by M. S. Crosby), two birds living five years, and one four years. Most of the records, however, are less than three years.

NUMBER OF CHICKADEES BANDED

1927–28

Fuertes Sanctuary, North Side	21
Fuertes Sanctuary, East Side	14
Other stations	13
Nestlings	13
Total	61

	No. Banded Birds	*No. of Unbanded Birds in Winter (estimated)*	*No. of Birds Seen (estimated)*
1928–29			
Fuertes Sanctuary, North	23	0	31
Fuertes Sanctuary, East	13	0	35
Fuertes Sanctuary, South	13	0	38
Lighthouse Road	14	6	..
Hillside (A, B, C)	12	6	27
Glenside	10	2	22
Sunset Drive	5	0	
Hanshaw Road	4	0	
Golf Club (A, B, C, and D)	37	0	
Fall Creek Drive (A and B)	17	4	
Physiological Station	6		
Poultry Farm	7		
Cascadilla	11		
Total banded Birds	172		
Total in Fuertes Sanctuary	49		60
Total in whole area where birds were studied (first 11 stations)	148	18	166

Returns from 1927–28	13
Returns from 1926	2
Nestlings banded	12

LITERATURE CITED

DAWSON, W. L., and L. JONES
Birds of Ohio. 1903.

DEMILLE, J. B.
Birds of Gaspé County, Quebec. *The Auk*, 43:525. 1926.

DIONNE, C. E.
Les Oiseaux de la Province de Quebec. Quebec, 1906.

DOUTHITT, BESSIE
Migration Records for Kansas Birds. *Wilson Bull.*, 31:50. 1919.

EIFRIG, G.
Winter Birds of New Ontario. *The Auk.* 26:56. 1909.

FORBUSH, E. H.
Useful Birds and their Protection. Mass. Board of Agric., 1905.

HORSEY, R. E.
Behavior of Black-capped Chickadee during Winter of 1923–24. *The Auk*, 41:616–617. 1924.

KIRKWOOD
Birds of Maryland. *Trans. Maryland Acad. Sc.* 1895.

LOW, A. P.
The Mistassini Region. *Ottawa Nat.*, 6:22. 1891.

MACOUN, J. *and* J. M.
Catalogue of Canadian Birds. Canada Dept. of Mines, 1909.

MAGEE, M. J.
How Long Do Purple Finches Live? *Bul. N. E. B. B. Ass.*, 4:132–136. 1928.

MCATEE, W. L.
Search for Food by Birds. *The Auk*, 37:341–344. 1920.

SANDERSON, E. D.
Economic Value of the White-bellied Nuthatch and Black-capped Chickadee. *The Auk*, 15:144–155. 1898.

SHRINER, C. A.
Birds of New Jersey. State Fish and Game Commission, 1896.

TAVERNER, P. A., and SWALES, B. H.
Birds of Point Pelee. *Wilson Bulletin*, 20:111. 1908.

TERRILL, L. McI.
Changes in the Status of Certain Birds in the Vicinity of Montreal. *Ottawa Nat.*, 25:62–63. 1911.

THOMPSON, S. L.
Birds of North Bay, Ontario, and Vicinity. *Can. Field Nat.*, 36:167. 1922.

TOWNSEND, C. W. and ALLEN, G. M.
Birds of Labrador. *Proc. Bos. Soc. of Nat. History*, 33: 1907.

VANTYNE, J.
A Diurnal Local Migration of the Black-capped Chickadee. *Wilson Bul.*, 40:252. 1928.

WEED, C. M.
Winter Food of the Chickadee. *New Hamp. College Ag. Exp. Sta. Bul.*, 54:1–16. 1898.

WIDMANN, OTTO.
Preliminary Catalogue of the Birds of Missouri. *Trans. Acad. of Sc. of St. Louis*, XVII, 1–287. 1907.

WINTLE, E. D.
Birds of Montreal. 1896.

WHITTLE, C. L.
Some Chickadee History. *Bul. N. E. B. B. Ass.*, 3:72. 1927.

WILSON, ALEXANDER.
American Ornithology. 1808.

To be Continued

BIRD-BANDING: ITS FIRST DECADE UNDER THE BIOLOGICAL SURVEY

By FREDERICK C. LINCOLN

AT the New York (1925) meeting of the A. O. U., I presented a paper entitled "Bird Banding: In Progress and Prospect." This was published in *The Auk* for April, 1926. That report covered the first six years of this method as a governmental activity, and it now seems fitting to present briefly a résumé of the accomplishments of the first decade.

This retrospect is viewed with pardonable pride by those charged with the direction of the work, and, it is believed, by every one who has actively participated. As was stated in the earlier report, "Bird Banding as a method in ornithology has come to stay," and while no one seriously thinks that it will supplant any other method, we do consider it the most important tool that has been placed in the hands of the ornithological craftsman since the art of taxidermy enabled him to preserve specimens for future study. Banding data may be little used by the majority of the professional ornithologists of the present day, as most of them already have more work outlined than they may be reasonably expected to complete in the normal span of years allotted to productivity. We would not urge that these specialists add to their other work by "taking on" further investigations to be conducted by this method, but their advice is invaluable, and it is with a feeling of sincere gratitude that I record the many valued suggestions that have come from ornithologists who are not themselves enrolled under the banner of Bird-Banding.

There is, however, a growing generation of ornithological students constituting what may be termed the "new school." These, fearing lest the science may reach a stage of stagnation under the methods of the "old school," are casting about for new lines of research. They find much that is still unknown, unknown because the methods formerly in vogue have not permitted precise investigation in all possible fields. To these, systematic banding is hailed as a means of solution for interesting and important problems.

As in all other innovations, difficulties both real and fancied had to be overcome, and for fear of burdensome repetition, I hesitate to recapitulate the trials and tribulations of the first two or three years. Usually, however, they had interest or humor, and so in a measure lightened their own weight.

Paramount among them was the struggle to obtain a source of supply for the necessary bands. Practically every manufacturer of aluminum smallware in the country was approached, either by letter or by personal visit, and finally in desperation the first Biological Survey bands were ordered from England. This resulted in the curious error where, through a transposition of two letters, the address, "Biol. Surv., Wash., D. C." was transformed into apparent cooking instructions, the finder of a banded bird being admonished to Wash, Boil, and Surv.

At this point a word of commendation is due to Mr. Theo. A. Gey, of Norristown, Pennsylvania, who for the last eight years has made practically all of the bands issued by the Survey. Not only did he invent and build the ingenious machine that produces the bands, but he has consistently shown an interest in the work that is far above mere commercialism. Each year has seen a reduction in his price quotation, thus enabling the Bureau to purchase additional bands with the limited funds available, and in addition his interest has extended to active support of one of the regional associations, of which he is a sustaining member.

Opposition to banding work upon humanitarian grounds by well-meaning but uninformed persons caused a little anxiety, as data were then lacking for refutation of all charges made that banding would result in wholesale destruction of bird-life. Any investigations of wild life that involve actual handling by man result in some mortality among the subjects, but with the years of experience back of us, and the carefully accumulated data bearing upon causes of avian mortality, it is a cause for much satisfaction to record that bird deaths directly traceable to the operator, his traps, or the bands, are so few as to represent a negligible quantity. Firearms excepted, the so-called "domestic cat" is a greater menace to our avifauna than all other causes put together.

In some quarters this opposition continues to smoulder, showing a tendency to flare up when some new means for the capture of birds is advocated. To these opponents I may say that there is no organization more concerned for the welfare of the wild life of North America, including its birds, than the Biological Survey, and personal contact with a great many banders at their trapping stations has demonstrated that the Bureau's coöperators are almost without exception worthy champions of the highest conservation principles. Accordingly, the bird-students of America may be assured that no trap or other device will be recommended for general use until

it has been carefully tested to learn that it will not have an objectionable effect upon our birds. Some methods that are efficient means for the capture of birds by the poacher may when properly used prove of great value to the bird-bander.

At one time, during the development period, it was contended that the rapid increase in feeding and trapping stations would destroy the economic value of insectivorous birds. I should like to be so sanguine that we shall ever have such a vast percentage of the bird population of America under our control, but study of the facts thus far made available leads me to believe that, no matter how greatly our banding stations are increased in number, or how efficient and energetic our operators may become, the sum total of the birds banded in any single year will be but "a drop in the bucket" of the total avian population. Occasionally individual birds act almost human and develop insatiable appetites for certain types of bait. Ordinarily, however, station operators have learned to their cost, that when natural food is abundant, it is very difficult to entice birds to the traps. Nevertheless, we are improving in our ability to furnish "appetizers," so this utopian idea may yet come to pass.

Now as to the work we have done:

First, a tablutation of the gross results, which will show also the growth of the project, will be of interest. The table presented is arranged according to the fiscal years of the Federal Government, that is, from July 1 to June 30 next ensuing. For the last two years the numbers of returns listed are merely estimates. They are, however, extremely conservative, as it is believed that the total number of return records in the files is close to 50,000.

Fiscal Year	*Co-operators*	*No. of Birds Banded*	*Returns*
1921	135	2,845	....
1922	...	6,000*	....
1923	851	25,068	....
1924	...	40,432	2,000†
1925	1,100	64,253	3,187
1926	1,134	68,418	3,351
1927	1,296	91,848	4,445
1928	1,400*	127,105	7,222
1929	1,500*	133,931	8,500*
1930	1,750*	182,263	10,000*
Grand Total		742,163	38,705

*Approximate. †Includes those of previous years.

It may be properly asked: What do these data show? The answer is, that for the first time in the history of American ornithology there is assembled a mass of definite, precise information illustrative of the complicated individual movements of our birds that go to make up bird migration. Heretofore, the study of this subject involved the use of material that was obviously incomplete, being nothing more than the records of arrival and departure of the different species in various localities. The actual movements of the individual birds that made up the flocks of aerial travelers could be only surmised, and one man's guess was as good as that of another.

We have also for the first time a great mass of information showing the development of the individual bird, the transition of its plumages, its identification with the same or different mates in successive seasons, and a host of other subjects that formerly were but imperfectly known.

From the viewpoint of the Biological Survey and those interested in its work, the subject of distribution and migration is of first importance, for the reason that interpretation of the data assembled from points over the entire hemisphere can be properly handled only at the central office. Obviously to the individual station operators their contributions to this subject have only local significance, while the Washington office is able to view the assembled results of local activities in the light of continental problems, and draw conclusions accordingly.

Ornithologists, therefore, may look with confidence to the Bureau for detailed reports on this subject, reports that will be based for the most part upon evidence obtained from banded birds. There are already at our command sufficient data to warrant the preparation of such a report upon the Mallard ducks, and it is hoped that this may be issued in the near future. The banding data used in this connection will throw great light on problems in the administration of these important game species. They will show not only the seasonal movements but the extent of the area that is affected by certain concentration and breeding grounds, the artificial mortality rate, and many other factors that are of the utmost concern to naturalists, sportsmen, and conservation officials. Because of the rapidity with which data are assembled for the game species, other waterfowl groups will probably receive similar treatment before an adequate accumulation of data will justify conclusions with regard to other species, particularly the smaller non-game birds. Exceptions may be noted in the case of some of the herons, gulls, terns, and blackbirds,

which for one reason or another, yield large numbers of return records.

I have stated that the individual banding stations are not in themselves in a position to make important contributions to the study of migration. There are exceptions, however, and mention should be made of the experimental work that is being conducted by Professor William Rowan, of the University of Alberta, work that should do much to prove or disprove the theory of photoperiodism as a cause of migration.

We come now to the investigations made by banding stations that can be carried to logical conclusions. Outstanding among these are the researches into the temperature-control and the local distribution of the House Wren made by the personnel of the Baldwin Research Laboratory, at Gates Mills, Ohio. These studies should light the way for similar investigations with the same or other species elsewhere. It is appreciated that very few banding stations will be able to install the elaborate and highly technical equipment that has been an important feature in the work of Mr. Baldwin and his associates, but among the multitude of problems awaiting solution there are many that can be conducted with practically no increase in the ordinary station equipment.

An excellent example of this is found in the study of the Chickadee and the White-breasted Nuthatch made near the campus of Cornell University by Dr. Wilbur K. Butts. The only additional equipment used was a series of celluloid bands of different colors made by the operator.

The bird laboratory, however, affords a means for determining some of the more intricate and complicated factors that enter into the lives of our birds. It is, therefore, a pleasure to refer to the O. L. Austin Ornithological Laboratory at North Eastham, on Cape Cod, Massachusetts, where recently I had the pleasure of spending a few days, and was afforded opportunity to see the excellent facilities that exist there for important work.

The study of the changes of plumages constitutes a vast field for original endeavor. Already two studies on this subject are well under way. Probably the best known is that of Mr. M. J. Magee, of Sault Ste. Marie, Michigan. Mr. Magee has banded well over ten thousand Purple Finches, and when it is remembered that for all of these birds he has detailed notes of the plumages, not only taken at the time of original capture, but followed up with additional comment when the birds have repeated and returned, the vast amount of data available will be better appreciated. It probably would not

be possible to assemble such a series of specimens from all the museum collections of the world, and here the material desired has been obtained without the necessity of transforming the birds into museum specimens. A similar study of the plumage of the Evening Grosbeak also has been undertaken by Mr. Magee, and while the quantity of data thus far obtained is much less than for the Purple Finch, it is nevertheless believed that he has more information on the subject than any other investigator.

Another plumage study that will be of the greatest interest because the information to be obtained will be directly comparable to that in the case of the Purple Finch has been carried on for several years by Mr. Harold Michener, of Pasadena, California. I have recently been advised that his first report on the study of the House Finch, has been accepted for publication in *The Condor*, and so should appear in the near future.

In conclusion it is proper to mention the fact that bird-banding as a means of obtaining original information has been adopted by fourteen colleges and universities, including Cornell University, American University, Michigan State College, Notre Dame University, University of Chattanooga, University of Missouri, North Dakota State College, and Leland Stanford Junior University. At these institutions, under the direction and guidance of professors of biology and zoölogy, graduate students are conducting investigations that should yield new and interesting information.

Bird-banding as a method in ornithological science has demonstrated its worth and has passed through the experimental stages during the past ten years. The next decade should witness the appearance of ornithological reports that would not be possible by any means other than through study of material obtained in bird-banding operations.

Biological Survey, Washington, D. C.

GENERAL NOTES

A Banded Adult Common Cormorant.—On July 25, 1930, Mr. George Jones, of Harrington Harbour, Quebec, and I were engaged in banding nestling Common Cormorants (*Phalacrocorax carbo carbo*) in the only colony of these birds on the north shore of the Gulf of St. Lawrence. This colony is situated on the cliffs of Lake Island, Saguenay County, Quebec, and is about a mile and a half east of Cape Whittle, which is the southwestern extreme of Lake Island. The adult Common Cormorants in this colony are often very bold in protection of their young when they are visited by human beings, and frequently remain perched at or near their nests while a human intruder is within a few feet of them, in a few cases even until he is so close that the bird is able to strike him.

As Mr. Jones approached one of the nests to secure the young for banding purposes, he clearly saw a band on the bare tarsus of an adult Common Cormorant that was perched on a ledge of rock beside the nest. At the time of making this observation he was only eight or ten feet distant from the bird, which enabled him to see the band distinctly, and showed also the bird's reluctance to leave the place, which was no doubt due to a strong parental instinct. Mr. Jones immediately called out to me that he saw "an old one with a band on," but his shout put the banded bird to flight, and, although I was only a few yards distant, I did not see the band.

In reply to an inquiry Dr. W. B. Bell, of the Biological Survey, informs me by letter dated October 14, 1930, that, up to that time, the only Common Cormorants banded in North America, so far as known to the Survey, were those banded by me in this very colony on Lake Island. I have banded nestling Common Cormorants, at this point in various years, beginning in 1923.

The observation by Mr. Jones of this banded parent Common Cormorant beside its brood of young appears to be, therefore, almost certain proof of a return by one of this species to its natal colony for nesting purposes. The capture, near St. Paul, Minnesota, early in 1930, of a specimen of *Phalacrocorax carbo sinensis* that had been banded in Holland on July 9, 1928 (*Der Vogelzug*, vol. 1, no. 3, July, 1930, as reviewed in *Bird-Banding*, o.s. vol. VI, no. 4, October, 1930, p. 195) points, however, to the bare possibility that the banded individual seen by Mr. Jones may also have been of European origin.—Harrison F. Lewis.

Protocalliphora Infestation of Barn and Bank Swallows.—A recent communication (July 21, 1930) from Frank J. Vejtasa, of Fairdale, North Dakota, transmitted some larvæ removed by him from nestling Barn Swallows (*Hirundo erythrogastra*) which have been identified by C. T. Greene, of the United States Bureau of Entomology, as *Protocalliphora splendida* Macq. The following quotation from Mr. Vejtasa's letter will be of interest:

"Yesterday while banding some Barn Swallows my attention was attracted to one of the birds by its heavy breathing. On examining it I found that there were worms clinging to its eyelids and to its throat, and two had entered into its nostrils, one being all inside and the other about half in. On removing the one . . . the other also came out far enough so that I could pull it out. I found that two other swallows also had some of these worms clinging to their eyelids and throats."

In a letter dated August 29, 1930, from Mrs. Marie A. Commons, of Crystal Bay, Minnesota, mention is made of an experience that she had in 1928, with what were apparently these same parasites. While commenting upon a recent banding expedition to a colony of Bank Swallows (*Riparia*

riparia) she recalled her former disagreeable experience in banding these birds when she found the birds "with fat maggots protruding from their nostrils." This year the birds that she banded (426) were found to be remarkably free from parasites of all kinds.

These flies are destructive to fledgling birds, and bird-banding coöperators should carefully remove all that are noted. "As the Bureau of Entomology is actively interested in the insects which attack birds, it is suggested that when maggots are found they be dropped into a vial containing alcohol, a tag attached bearing the date, locality, name of the host, and the name and address of the collector, and then forwarded to the Bureau of Entomology, Washington, D. C., for record and identification of the parasite involved."—FREDERICK C. LINCOLN, U. S. Biological Survey.

First Banding of the Little Blue Heron in New England.—During the summer of 1930, the Pleasant Valley Bird and Wild Flower Sanctuary, at Lenox, Massachusetts, had various opportunities to fulfill its mission in behalf of birds that were in need of hospital treatment. Our most notable patient was an immature Little Blue Heron (*Florida c. cærulea*), received on August 8th. Of the hundreds of these birds that were seen throughout southern New England this fall, the distinction fell to this heron of being the first of its kind ever banded in this region. The bird was captured at Pontoosuc Lake, Lanesboro, by some small boys who claimed to have watched it struggling to arise from the water. On being notified of the event, the writer lost no time in securing the bird. Its plumage was snowy white, and it seemed to be in excellent condition, except for the toes of the right foot being mangled. Apparently a snapping turtle was the cause of its struggles. During the next five days it showed a hearty appetite by consuming a liberal quantity of minnows, and on August 13th, seeming to be perfectly able to care for itself, it was given a band numbered A519951, and freedom. Situated about a third of a mile west of the Sanctuary is the little reservoir of the Hotel Aspinwall. It was here that we found the bird until August 21st, evidently well off and none the worse for its adventures.—MAURICE BROUN, Lenox, Massachusetts.

Parasites on Birds taken at Summerville, South Carolina.—A noteworthy feature of the banding season of 1930 at Summerville, South Carolina, was the marked prevalence of ectoparasites, especially of ticks. I stated in an article published in the *Bulletin* of January, 1929, that in 1928 twelve birds out of a total of 704 banded were recorded as having ticks. In 1929, out of a total of 658 birds banded, 38 were afflicted with ticks. In 1930, out of a total of 944 birds banded, 83 were recorded as having ticks. The increase as expressed in percentages is as follows: in 1928 1.7% of the birds banded were affected, in 1929 5.77%, in 1930 8.80%. Undoubtedly a considerable number of small ticks escaped observation, so that the actual percentages were probably larger than indicated. In view of the fact that the thicket-inhabiting birds are unquestionably more likely to be attacked by ticks that those which frequent open areas, the figures just given do not convey an adequate idea of the large proportion of such species as the White-throated Sparrow and Towhee which were acting as hosts of ticks. Thus, in 1929, 13% of the White-throats were noted as being tick-infested, and in 1930, 11.7%. With the Towhees the percentage was much larger than with any other bird, 20% being infested in 1929 and 47.12% in 1930. Final determinations have not been made yet of some of the ticks which were saved, but apparently *Ixodes brunneus* largely predominated. Birds taken in the later part of the winter

of 1930 were less affected than those taken earlier. The reason for this may lie in the fact that much of the trapping during that time was done over recently burned areas. Ticks were noticed to be very much less abundant, and sometimes almost wholly wanting, on flocks taken in those sections.—Wm. P. Wharton.

A Banded Little Blue Heron in New Jersey.—We are advised by Mr. Charles A. Urner that among the numerous Little Blue Herons on the Newark Meadows, New Jersey, this summer (1930) one adult was seen to be banded on the right leg.

In view of the extensive banding operations carried on near Charleston, South Carolina, of which Mr. Alexander Sprunt, Jr., has told us, the presumption is that this individual was banded there two or more years ago as a young bird. Sight records of the percentage of banded birds in the northern flight each summer, combined with observed percentages at the southern banding locality, would furnish interesting evidence bearing on the nature of the flight.—J. T. N.

Foot Disease on Birds at Summerville, South Carolina.—Further record of the prevalence of the foot disease which so commonly effects the Chipping Sparrow was kept during the winter seasons of 1929 and 1930 at Summerville, South Carolina. In 1929, 44 birds of this species out of the 323 banded were found to be affected with this trouble in its active form (13.62%), while 31 showed unmistakable evidence of having had it and recovered from it. In 1930, 13 of the 255 birds banded were found to have the disease in active form at one time or another during the season (5.09%), while 24 showed evidence of having suffered from it previously.

Field Sparrows were diseased to the extent of 3 out of the 17 banded in 1929 (17.6%), and 11 out of the 57 banded in 1930 (19.3%).

Out of 21 Juncos banded in 1929, 2 (9.50%) were affected with an active foot disease which heretofore I have assumed was the same as that found on Chipping and Field Sparrows. (Owing to the different appearance of the swelling on the feet of Juncos, and the apparent lack of inflammation severe enough to cause maturation and subsequent loss of portions of the toes, as happens with Chipping and Field Sparrows, I have recently felt doubts of the identity of the disease found on this species.) Out of 49 Juncos banded in 1930, 3 were affected with active disease, and one had a sort of a canker on the foot which may have been related to it. Assuming that 4 birds had the disease, the percentage was 8.16%.

One Meadowlark out of the 29 which were banded in 1930, was recorded as having the "left middle toe swollen to next to last joint; beyond that atrophied and dried up." This case, in appearance at least, resembled the foot disease as it frequently manifests itself on Chipping Sparrows.—Wm. P. Wharton.

Irregular Molting of a Savannah Sparrow.—On September 4, 1930, we noted a Savannah Sparrow (*Passerculus sandwichensis savanna*) with an apparently injured wing. The bird was able to rise only twelve or fifteen inches above the ground and flutter quickly to earth again. Deciding to investigate, we gave pursuit, when, after several failures of this kind, the bird abandoned attempts to fly and began to run through the grass. We were soon able to capture it and found eight primaries and three secondaries missing. As these were in consecutive order beginning with the second primary, quite a gap was made in the wing. All the upper coverts were also involved. The new primaries and secondaries were in

an early stage of development, as the vanes were just beginning to emerge from their sheaths. The moult had evidently been completed in the other wing, and careful examination of all other tracts failed to disclose any evidence of the process. The plumage elsewhere was fresh as though recently acquired.—WENDELL P. SMITH.

A Song Sparrow Return-4.—On September 25, 1930, Song Sparrow (*Melospiza m. Melodia*) No. A9211 returned for the fourth time. This bird was banded on April 4, 1925, and returned April 28, 1926; August 19, 1927; and April 21, 1929. This bird is nearly six and a half years old at least.—WENDELL P. SMITH, Wells River, Vermont, October 3, 1930.

Banding Starlings.—Owing to the rapid increase of the Starling (*Sturnus vulgaris*) particularly in the Middle West and Southwest, it is very desirable that as many as possible of this species be banded. Full knowledge of their migratory habits, which seem to be developing, will make future control effective. Perhaps the easiest way to capture these birds is when they crowd close together during the coldest weather in ventilating-towers of buildings, church steeples, and barns. By using a strong flashlight twenty-five or more may be captured at a time by hand and placed temporarily in a grain-sack, to be banded later.

Through the courtesy of Dr. Eugene Walker, Superintendent of Lakeside Hospital of the University Hospitals of Cleveland, the writer, together with Dr. John A. Brady, of Lakewood, banded more than a hundred of the Starlings roosting in the ventilating-towers of the hospital buildings during the winter of 1929–1930. The greatest number at the roost was estimated at 2100.—E. C. HOFFMAN, 1041 Forest Cliff Drive, Lakewood, Ohio.

Wing Injury.—On the last page of the July, 1929, number of the *Bulletin*, I stated in a letter to the Editor that I had had some trouble with apparent wing injury to birds while held in the hand, and that I had never known such birds to recover their power of flight. I am now glad to instance four definite cases in which, following the type of injury there described, I have retaken birds which had apparently fully recovered:

Black and White Warbler B32903, banded August 27, 1929, and apparently unable to fly when released, repeated September 12th and was then able to fly.

Towhee 582923, banded January 25, 1929, and unable to fly either when released or three days later, was retaken as a return January 18, 1930, at which time it was apparently perfectly normal.

Towhee A203971, banded January 3, 1930, went off on the ground, and was still unable to fly on January 20th. On February 18th, however, it was noted as being in good condition.

A recent example is that of a Song Sparrow banded August 16, 1930. This bird did not get its wings free in the way which I indicated in my letter of 1929 might cause the injury in question, but probably got just enough clearance to be able to press the wings back with a convulsive effort against my hand. I was conscious of the slight snap mentioned in my description of the trouble, and the bird went off on the ground. On August 18th this bird repeated and was still unable to fly. On August 23d it flew, though apparently with some effort, but on the 25th and 26th and on one or two subsequent dates it has acted perfectly normally. Thus it would appear that the injury in question is one which, at least in a substantial number of cases, is overcome, though in the meantime the bird

is to a greater extent than normally exposed to the attacks of its enemies. From the experiences of the past year or more, I am satisfied that this injury to the wing, whatever may be its explanation, can be wholly avoided by holding the wings close to the body in their normal position during the entire time in which the bird remains in the bander's hand.—WILLIAM P. WHARTON.

Repeating White-throats.—Although I have become an active bird-bander, I hardly feel as though I knew much about it. In banding over 925 birds of 27 species during the past year, and being on the constant lookout for birds showing marked individuality, none aroused more interest than an adult female White-throated Sparrow that came to one of three rather closely situated traps over a period of ten days with a persistency that is difficult to explain. Perhaps the over-development of the trap habit in a bird may be termed a "trap complex." The banding date of this White-throat (No. B109968), captured in a Government sparrow-trap, was October 5th. It was not present on the 6th. On the 7th it was recaptured twice, on the 8th six times, on the 9th four times, on the 10th five times, twice on the 11th, twice on the 12th, five times on the 13th, five times on the 14th, and finally, three times on the 15th. I have never before experienced this, although to-day another White-throat that made its initial appearance, an immature female, repeated *eight* times!—MAURICE BROUN, Lenox, Massachusetts.

Variations in Towhee Irises and Rectrices.—During the winters of 1929 and 1930 in Summerville, South Carolina, further record was kept of both of the Towhees with reference to the following characters: (1) color of the iris, and (2) number of tail-feathers on each side tipped with white.

In the case of those identified as Towhees (*Pipilo e. erythrophthalmus*), 99 of which were banded, 44 had irises described as blood red, 38 irises described as reddish brown, 8 irises as brown, and 4 as light reddish. The tail-feathers were noted in the cases of 92 of these birds, 67 of which had 3 white-tipped feathers on each side, 22 had 4 feathers, 2 had 5, and one bird was recorded as having only 2 feathers thus tipped. The bird last mentioned had the rather unusual combination of a dark-brown iris and only 2 white-tipped tail-feathers, which made its classification somewhat difficult. Probably the depth of brown of the iris, possibly combined with a greater amount of white in the plumage other than the tail, decided the classification made. The combination of brown iris and 4 white-tipped tail-feathers, while less noteworthy, was seen in only two instances.

In the case of those identified as White-eyed Towhees (*Pipilo e. alleni*), 38 of which were banded, 3 had pure white irises, 17 had light yellow ones, 7 straw-colored, 1 orange, and 10 light brown. In the matter of tail-feathers 12 had 2 on each side white-tipped, 24 had 3, and one had 4. This last bird had a straw-colored iris, making a combination as unusual as that of the dark-brown iris and 2 tipped feathers mentioned above in the case of the presumed Towhee. One bird with a light-brown iris and 3 tail-feathers with very slight white tips, was called a White-eyed Towhee because of the lightness of the brown iris.

The foregoing record, while it proves nothing, serves to indicate the wide variations within the species and the sub-species of the characters mentioned. Despite efforts to interest permanent residents of Summerville in close observation of the birds found there during the summer, with a view to ascertaining if any with red, reddish, or very dark brown eyes remain there, thus far as least I have been unable to get any information

on this important point, which more than anything else would throw light on the question of whether any birds of the northern form interbreed with those which are permanent residents.—Wm. P. Wharton.

What was wrong with this House Wren?—On June 24, 1928, while, a brood of nestling House Wrens (*Troglodytes aëdon aëdon*) were being banded, one of the parent birds, banded 22 days previously, appeared near the nest acting in a seemingly strange manner. Fluttering as though crippled, it fell to the ground at a distance of fifteen feet from the writer. Supposing the bird to be severely injured or dead, I walked forward and picked up the prostrate form. The bird was retained until apparently recovered (about ten minutes) and then released, to enact the same performance. It was again retrieved and, after being held five minutes, released, when it flew with agility. This bird was taken as a repeat forty-four days later in a near-by nest-box, with a new mate, rearing a second brood. Hence, it is certain that complete recovery was won.

Whether this action can be classified as a reaction to molestation of the nest might be questionable. Since it occurred coincident with the disturbance of the nest, this would appear to be a tenable diagnosis. Certainly, in any event this bird was not feigning crippledness.—Paul A. Stewart, Leetonia, Ohio.

Plumage Pattern of the Screech Owl.—A Screech Owl (*Otus asio asio*) gray phase, was banded at Lakewood, Ohio, October 20, 1930, No. 309305.

No trace of brown or rufous appeared, the feathers being mostly light gray, barred with darker gray and black. The breast and throat showed a symmetrical area almost white bordered with black. Excepting for the iris, which was yellow, the photograph shows the owl in its true colors, the only colors present being shades of gray, black and white.

Examination of the photograph, shown here, in a dim light or at a distance of several feet shows a change to a grotesque plumage pattern. Perhaps the photograph when viewed close up represents the bird as his friends see him, the other aspect being reserved as a warning pattern for his enemies or as a terrifying pattern for prospective prey.—E. C. Hoffman, Forest Cliff Drive, Lakewood, Ohio.

Three White-crowned Sparrow Recoveries.—Out of a total of 59 White-crowned Sparrows (*Zonotrichia leucophrys leucophrys*) banded at my station I have one recovery. An individual of this species banded at my station with No. 686014 on May 9, 1929, was recovered at Delhi, Oklahoma on December 8, 1929. An investigation has thus far revealed only two other recoveries for this species east of the Rocky Mountains, One of these birds was also banded in Indiana and later recovered in Quebec. The third individual was banded in northeastern Illinois and recovered in northern Texas. Although these recoveries are insufficient in number to draw general conclusions, the question arises as to what extent there is a southwest and northeast migration in this species.—S. W. Witmer, Goshen College, Goshen, Indiana.

Note on Tree Sparrow Groups.—On February 7, 1930, I caught two Tree Sparrows and banded one of them, C682. The other was a repeat, C608. On November 27th I saw the first Tree Sparrows about my banding station and captured one which was my number (C682). This morning, November 28th, at breakfast another Tree Sparrow entered the trap and it was my number C608. In other words, the birds which were together last February were together at the end of November. This morning, November 28th, I have additional evidence of the permanency of membership in Tree Sparrow flocks by recapturing my Tree Sparrows, numbers C667 and C668, both of which were trapped on February 3, 1930, and number C646 which was trapped on January 12, 1930.—W. Rodman Peabody, Milton, Massachusetts.

OUR COVER DESIGN

Bird-Banding begins its second year with a cover design drawn and submitted by Dr. John B. May, one of several additional drawings which we hope to secure and use in future issues of the journal from time to time.

It is hoped that readers of *Bird-Banding* will feel free to express their opinions as to the suitability of the subjects used and will aid us in obtaining a design that will be approved by the great majority of bird-banders. In addition we solicit drawings and photographs from banders and others interested in the matter in order that our officers may be in a position in the near future to select the best possible permanent cover emblem.

There are several reasons why the Black-crowned Night Heron might be an appropriate emblem for this journal. When the New England, now the Northeastern Bird-Banding Association, was organized, its officers cast about for some subject to use in a cooperative banding campaign. The Night Heron, breeding in large colonies, was chosen for the first work and for several seasons an enthusiastic group of banders made annual visits to the great rookery at Barnstable, Massachusetts, banding nearly three thousand young birds during these visits. Much interesting data were gathered as a result of this work, which has been described in several issues of the *Bulletin* of the Northeastern Bird-Banding Association.

However, this was not the first banding of Night Herons, for the Barnstable Rookery had been visited in 1909 by two members of the American Bird-Banding Association, which resulted in seven recoveries, and Dr. Paul Bartsch had also banded a number of Night Herons near Washington, D. C., and had obtained some of the earliest recoveries recorded in America. This species breeds throughout the United States and a large part of Canada, so that it is known to the great majority of bird-banding cooperators and it makes long and interesting migration journeys, about which we have still much to learn.—C. L. W.

RECENT LITERATURE

American Waterfowl: Their Present Situation and the Outlook for their Future. By John C. Phillips and Frederick C. Lincoln. Published by Houghton Mifflin Co., Boston. It is a pleasure to review a book like the present. Crowded into compact but very readable form is a vast amount of carefully collated data on a subject which is important to all sportsmen, ornithologists and bird lovers. The senior author, well known for his great monograph on the Ducks of the World, is even better known to many as an ardent sportsman, and so it is doubly gratifying to note the care with which the data has been gathered and the temperateness of the opinions expressed throughout the volume. As typical of the point of view and liberality of the writers let me quote a few lines from the chapter on "Natural Enemies" of waterfowl. They write "We may confidently assert that the idea prevalent in the minds of many sportsmen that hawks and owls are responsible for a heavy mortality among waterfowl is utterly fallacious. Of all bird-killing hawks, only one, the Duck Hawk or Peregrine Falcon, possesses flight superiority that enables it to overtake and capture even the slowest of the ducks, and these hawks are today so uncommon that it is doubtful if many sportsmen have ever seen one. And even so the Peregrine is such a magnificent bird, and possesses such perfect mastery of the air, that the spectacle of one in pursuit of a swift-flying teal or other duck should call forth the highest admiration of the observer, rather than a feeling of resentment coupled with a desire to kill the bird which is striving to do only that which the hunter himself had planned. . . .We do wish here to register our opposition to the senseless slaughter of hawks, owls, gulls, harmless snakes, and other species that only too frequently are killed on sight, merely because it is thought that they may at some time kill a duck or some other game bird."

The volume is divided into four parts, under the headings "Our Waterfowl and their Habitats" including chapters on their breeding areas, wintering grounds and migrations; "Adverse Factors" including drainage and irrigation, shooting, poisons, diseases and parasites, natural enemies, and oil pollution; "Conservation" in general and a chapter on food-plants; "Sport and Sportsmen" with some remarks on the ethics of the various practices; and an Appendix which gives the common names, ranges, notes on present status, and a table of weights.

The bird-bander will find much of interest and encouragement in the book, as might be expected from the junior author, head of banding operations of the Biological Survey. On page 35 we read "We know very little, indeed, about the winter movements of ducks in the lower Chesapeake and in Currituck. What becomes of the ducks that are frozen out of the Havre de Grace flats and other shallow bays? Is there an interchange of Canvas-backs, Redheads, and Scaups between the Chesapeake and Currituck regions? Where do the Currituck and Back Bay (Virginia) ducks go when they are frozen out or driven out by various causes? Only extensive banding of diving ducks can throw any light on these points and also give us an idea of the relative numbers of these ducks which fall to the gun each year. We have a great deal better knowledge of the surface-feeding ducks, through banding, than we have of the diving ducks." Again we read "Where do all the California ducks come from? This question should be easily answered in the future through intensive banding. . . .Banding work has clearly shown the natural spread and interchange between the California and the interior ducks." In the chapter on "Migration" are frequent references to recoveries of banded birds and the light these have thrown upon our knowledge of migration routes, of the rate of

migration, and so forth. In the chapter on "Shooting as an Adverse Factor" banding data are used in estimating the mortality from this cause, and, using the average of these returns, between twelve and thirteen per cent of banded ducks being killed during the first following shooting period, an estimate is made of the total number of ducks present annually in the region treated. Using this and various other factors the authors reach the conclusion that the total kill annually in the United States is, conservatively, between 8,000,000 and 9,000,000 ducks and 100,000 to 150,000 geese, to which they add 1,000,000 to 1,500,000 ducks and 50,000 to 100,000 geese killed annually in Canada. When we add to these figures the mortality from poisons, diseases and parasites, and from oil polution, the newest and one of the most serious menaces to waterfowl, we realize the need of a survey such as this book presents.

Typographically, the book is a credit to the authors, the artists who illustrated it, and the publishers. Seven beautifully reproduced paintings by Major Allan Brooks show thirty-two species of waterfowl in flight, as they would appear when passing the gunner in the field, and these should be of great assistance in field identification of the different varieties. The chapter headings by A. L. Ripley are delightfully delicate little vignettes of waterfowl or sporting scenes. In fact, our only criticism of the entire book is in the small detail of the use of local gunners' names in the titles of a few of the ducks illustrated, such as Long-tailed Duck and Blue-bill, instead of the accepted A. O. U. names, Old Squaw and Scaup. Our sporting literature is full of local names of limited application and books such as this should be a means of broadening and perpetuating the use of the officially correct nomenclature.—J. B. M

Der Vogelzug, vol. I, No. 4, October, 1930.

This number, which completes the first volume of this valuable journal, opens with a thoughtful and stimulating paper by Ernst Mayr and Wilhelm Meise on some theoretical considerations of bird migration. After briefly reviewing some of the more important attempts at an explanation of bird migration, they present their own findings and decisions. The main body of the paper is divided into three sections: an hypothesis of the origin of bird migration; the development of the migratory impulse; and the subject of winter ranges and the lengthening of the migratory journey. The general conclusions are conveniently summarized in two places in the paper, and are here translated for the benefit of those who have not access to *Der Vogelzug* or who cannot read the German language.

1. Birds tend to be permanent residents in areas in which conditions remain constantly at their optimum throughout the year.

2. Bird migration is an unmistakable consequence of the change of conditions with the seasons. Just as the seasons were fairly well established and their differences marked before the ice age came, so, too, migration was a definite thing in the lives of the birds to a very considerable extent before the birds underwent the influence of the ice age.

3. During the ice age our (European) birds were rather concentrated in a relatively small area in the south; migration took place during the ice age, but only to a limited extent geographically (i.e., the geographical distances involved were not great).

4. Bird migration in its present form is a result of development since the ice age. With the retreat of the ice, large areas were rendered available, and were occupied as a result of the natural tendency of birds to spread out into "empty" territory. However, because of the marked seasonal changes, these regions could not be inhabited all through the year, but had to be vacated during the season of inhospitable, inclement weather.

5. Many and diverse factors and conditions have subsequently greatly influenced and molded these basic factors, so that at present almost every species has developed and built up a slightly different picture of the migratory habit (such differences as route, distance, time required, etc.).

6. The occurrence together of winter visitors and breeding, resident birds undoubtedly exercises an influence on the seething density of the population in the winter quarters.

7. The outpouring from the winter quarters and the return to the breeding-areas are not to be explained on the basis of external conditions operating to-day, but only through the migratory habit, which has become an inherited instinct. What caused the birds to leave the pleasant, favorable tropical and subtropical regions before the time of the origin of the migratory instinct is not clear.

8. Often the winter range and the migratory path have been altered both in geographic location (direction, etc.), and in extent (distance, etc.) in the case of individual species.

9. Lengthening of the migratory journey has been demonstrated in a number of different cases. It appears to consist chiefly of a matter of shortening or reducing all roundabout routes, and adding the distance thus saved to the main direction of flight.

10. A lengthening of the migration path largely precedes an extension of the breeding-range. It concerns, first of all, the spring migration, but its influence is carried over and appears in the subsequent strengthening of the migratory impulse in the autumn migration as well. Indirect evidence of this may be found in the fact that the winter range may be located in another zoögeographic region, and the resulting fact that the migratory path traverses and crosses from one region to another.

In general, it is the opinion of the reviewer that the authors seem to rely too wholly on a thesis (yet to be proved) that the winter range is the ancestral home of all species of birds. The main contribution of this paper seems to be the suggestion that there was definite migration before the ice age, that the latter merely altered and exaggerated the habit in some regions, and that the present bewildering diversity of migration paths, distances, etc., is all a post-glacial development. However, much of this has previously been said, in perhaps slightly different words, by other authors.

The second paper is by Doppelmair, and deals with bird-banding at the "Frost-Instituts" at Leningrad. The records are arranged according to species, and data are given for a teal (*Nettion crecca*), the Mallard, the Gray Goose (*Anser anser*) and the Black Grouse (*Lyrurus tetrix*). The paper is merely an extract from a longer and much fuller report published in Russian elsewhere. Birds banded in Soviet Russia were recovered in England, Germany, and various parts of Russia.

Rudolf Drost contributes the first of a proposed series of papers on how to tell the sex and age of migrant birds. In this installment he discusses three common birds, a flycatcher (*Muscicapa hypoleuca*) a warbler (*Sylvia communis*, and the Redstart (*Phœnicurus phœnicurus*). The discussion deals with all those slight, but reliable, differences in plumage, by which the bander may be able to identify more fully the bird he bands. It would be worth while to imitate this in this country, as all our bird manuals are either field keys or museum keys in their fundaments, while the needs of the bird-banders are slightly different from those of the opera-glass enthusiast or the museum investigator. Characters by which ages and sexes differ in spring and autumn, clues as to whether a bird is a post-breeder or a belated migrant by characters of molt, feather-wear, etc., are the sort of criteria that need to be stressed for the purposes of bird-banding.

Among the shorter notes, which complete the number, are articles by Kramer on the spring migration of 1930 at Rossitten; by Drost on

Œnanthe œnanthe schioleri as a migrant at Helgoland; another on the same topic by Salzmann. Emeis comments on migrants in the Tunisian steppes south of the Atlas Mountains; Hörtling writes on the migration of the Great Spotted Woodpecker at Rossitten and Helgoland; while a number of observations on the Crossbill invasion of 1930 are tabulated collectively by countries. A table of contents and an index complete the number and the volume. —H. F.

Wilson Bulletin. Volume XLII, No. 2. This issue contains an article on "Chimney Swift Banding Operations at Chattanooga" by Wyman R. Green, including a map and several halftones from photographs, but the material is the same which was treated by Mr. Green in his interesting article in BIRD-BANDING for July, 1930, and so needs no further reviewing here.

In a discussion of the "Status of Gambel's Sparrow in Michigan" Josselyn Van Tyne brings out the interesting fact that this bird was first recognised as a visitor to the state by a bird-bander, Mr. M. J. Magee of Sault Ste. Marie, who captured and banded a Gambel's Sparrow on May 21, 1925, and sent a sketch and description to Dr. Van Tyne for confirmation of his identification. Dr. Van Tyne then found that three earlier specimens, mislabelled White-crowned Sparrows, were in reality Gambel's Sparrows. Since that time Mr. Magee has captured six other specimens at his banding station and Prof. J. W. Stack and Mr. F. E. Ludwig have each captured and banded one bird. This interesting paper brings out afresh the importance of careful scrutiny of all birds handled in banding operations. In cases of doubt regarding unusual birds, it is well to retain the bird in captivity until an expert may be consulted, or if this is impossible, the bird should be photographed or sketched and its portrait, with a description written while the bird is in captivity, sent to a recognized ornithologist for identification.—J. B. M.

Wilson Bulletin. Volume XLII, No. 3. C. E. Holcombe describes his experiences with banded Bluebirds in Illinois. In 1927 he banded a pair of Bluebirds and their young. In 1928 the female returned with a different male and raised two broods. Again in 1929 the female returned, but with a third male for partner. In view of the generally accepted theory that the male bird is the one which establishes a "territory" this experience is interesting and suggestive.—J. B. M.

British Birds. Volume XXIV, No. 2. On pages 55–56 H. F. Witherby describes the recovery of a Black-headed Gull which was banded in Great Britain on June 13, 1910, and recovered near the same place on May 26, 1930, so that the bird was twenty years old at the time of recovery. Mr. Witherby comments further on a Golden Eagle from Germany which was twenty years old when recovered, a Tufted Duck, a Cormorant and a Shag of fourteen years, a Woodcock of twelve years, Lapwings of twelve and eleven years, and a Blackbird of ten years, among recent records. —J. B. M.

British Birds. Volume XXIV, No. 3. On pages 70–72 H. F. Witherby reports on "Birds Ringed in Iceland and Recovered in the British Islands." These recoveries were of birds banded by Mr. P. Skovgaard of Denmark or by his agents and were previously published, with others, in *Danske Fugle*. Mr. Witherby lists 55 individuals of ten species, all, with the exception of one White Wagtail, one Great Black-backed Gull, two Snipe and thirteen Golden Plover, being ducks. No less than eighteen European Wigeon are recorded from Great Britain, with the added comment "Besides these birds recovered in the British Islands and recorded above, Iceland Wigeon have

reacl ed S. W. Spain (1); France (2); Ravenna (Adriatic), Italy (1); Tula (south of Moscow) Russia (1); while no less than four have reached America, viz., Newfoundland, Nova Scotia, Massachusetts and Maryland." As with our American waterfowl, most of the recoveries were during the first hunting season following the placing of the rings, and the birds were presumably nestlings when ringed; the longest interval was two years, two months and three weeks.

On pages 77–78 Mr. Witherby comments on a Cuckoo, ringed in England June 23, 1928, and shot by a native in French Cameroons, January 30, 1930. Only two other British-ringed Cuckoos have been recovered outside of Great Britain, one at Muhlhausen, Germany, and the other near Reggio, Emilia, Italy, both being young birds in their first migratory journey.—J. B. M.

CORRESPONDENCE

MAKING CELLULOID BANDS

Editor of Bird-Banding:

I read with much interest the article by Dr. Butts in the October number. Some very interesting facts will doubtless be found from observing marked individuals. I have found an easy and quick way of making celluloid bands and offer it for any who may be interested.

The celluloid of which toys and rattles are made I find preferable to the sheet kind, which does not shrink. I use a nail of diameter equal to the size of the band I wish to make, and cut a piece of celluloid as long as the nail and as wide as the band is to be round, providing, of course, for an overlap. A short immersion in boiling water softens the piece enough to wind it around the nail and then I wind string tightly over the whole length of the piece on the nail. A longer immersion, several seconds, shrinks the celluloid to conform exactly to the diameter of nail. When it is cooled and the string is unwound, a celluloid cylinder results of proper diameter that may be cut into several bands of required width with a razor-blade. Shrinking them to the form makes them very springy, and they fit well and neatly when placed on the birds.—James Rintoul, Bardonia, New York.

BIRD-BANDING

A Journal of Ornithological Investigation

(Published Quarterly)

Charles L. Whittle, *Editor*
River Crossroads, Peterboro, New Hampshire

Associate Editors
- Francis H. Allen, 215 LaGrange St., West Roxbury, Massachusetts.
- John T. Nichols, American Museum of Natural History, 77th St. and Central Park West, New York City
- Prof. J. W. Stack, Michigan State College, East Lansing, Michigan
- Winsor M. Tyler, M.D., Brimmer Chambers, Brimmer St., Boston, Massachusetts.

Officers of the three Bird-Banding Associations

Northeastern
- Laurence B. Fletcher, *President*
- S. Prentiss Baldwin, *Honorary President*
- *Vice-Presidents*:
  - Francis Beach White, New Hampshire
  - Harrison F. Lewis, Eastern Canada
  - Donald McMillan, Massachusetts and Labrador
  - Henry S. Shaw, New Hampshire
  - Francis H. Allen, Massachusetts
  - Charles L. Whittle, New Hampshire
- Mrs. Alice B. Harrington, *Recording Secretary*
- Charles B. Floyd, *Secretary and Treasurer*, 95 South St., Boston, Massachusetts

Eastern
- John T. Nichols, *President*
- S. Prentiss Baldwin, *Honorary President*
- John A. Gillespie, *Vice-President*
- T. Donald Carter, *Secretary*, American Museum of Natural History, 77th St. and Central Park West, New York City
- Warren F. Eaton, *Treasurer*

Inland
- William I. Lyon, *President*
- S. Prentiss Baldwin, *Honorary President*
- *Vice-Presidents*:
  - Clarence Bretsch
  - Frank W. Commons
- M. J. Magee, *Treasurer*
- J. W. Stack, *Secretary*, Michigan State College, East Lansing, Michigan
- Herbert L. Stoddard, *Field Secretary*

All articles and notes should be submitted to the editor. Manuscripts should be double-spaced and written on only one side of the paper. It is desirable that they reach the editor by the first of the month preceding the month of publication.

Subscription price, $1.50 per year. Single number, 50 cents. Subscriptions should be sent to Charles B. Floyd, 95 South Street, Boston, Massachusetts.

Applications for membership in any of the three Associations should be sent to their respective secretaries. The annual membership dues are $2.00 per year in the Northeastern and Eastern Associations, and $2.50 in the Inland Association. Each members receives *Bird-Banding* free.

Publications for review should be sent to Dr. John B. May, 136 State House, Boston, Massachusetts.

Bound reprints of articles may be had at nominal prices. Fifty copies of four to six printed pages cost about five dollars. Reprints should be ordered early by writing to the editor, preferably when manuscripts are submitted for publication. Any number may be ordered.